

Using cameras for beam diagnostics in LCLS-II at SLAC

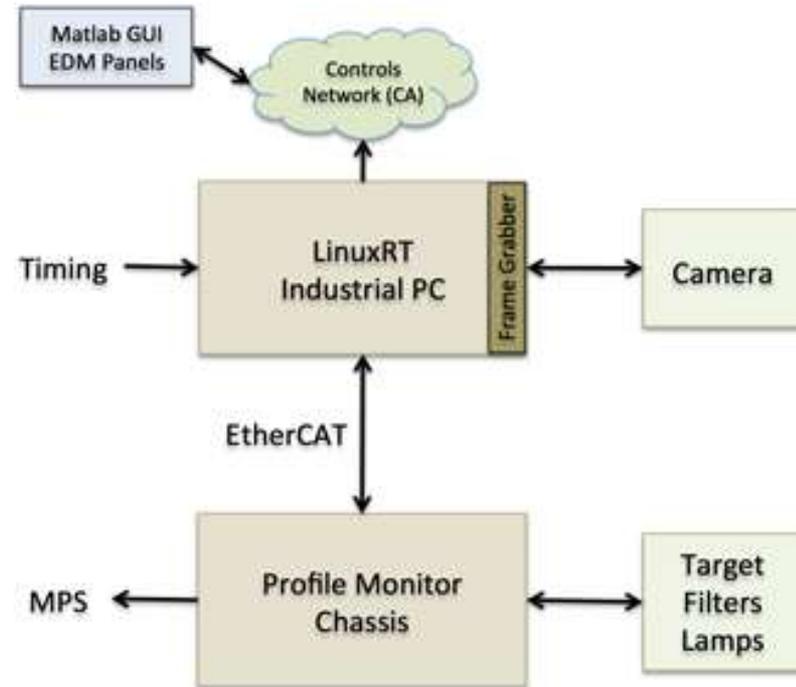
Jeremy Mock
SLAC National Accelerator Laboratory
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LCLS-II Camera Controls

Physics requirement to acquire beam profile rates up to 120 Hz

Developed Custom FrameGrabber based on PGP card developed in house

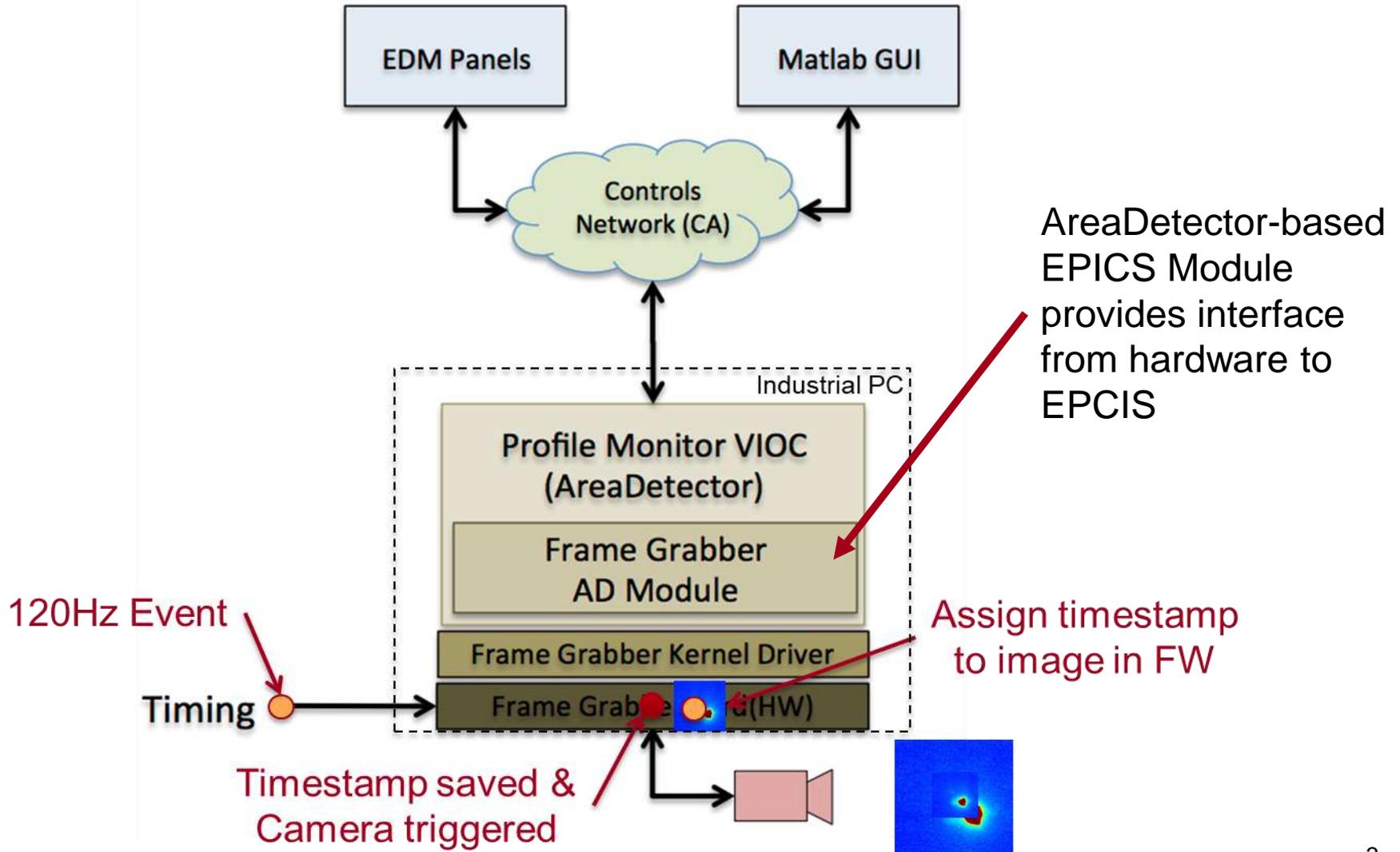
- Firmware modification to handle camera link protocol
- Provides 120 Hz Acquisition (tested in LCLS-I since 2016)
- Connects up to 8 cameras
- Includes embedded timing firmware
 - Provides reliable image time stamping
 - Minimizes number of CPU interrupts
 - Removes need for dedicated EVR



1 fiber optic pair to camera



Software Stack



Future Plans

- This version of the system is working well
- FPGA operating at ~95% capacity
 - Cannot load LCLS and LCLS-II Timing support simultaneously
- Identified a commercially-available board from Xilinx
 - KCU1500
 - Much more cost effective
 - Much much larger FPGA
 - Both timing and some image processing
 - Only support 6 cameras



Conclusion

- SLAC has identified a solution to acquire, tag, and process images at desired rates
- Upgrade to the AreaDetector plugin
- The system is operational in LCLS Production currently